TITLE OF INVENTION

METAL TANK COUPLED WITH A SYNTHETIC RESIN MATERIAL, AND UNIT PANEL FOR THE SAME

FIELD OF THE INVENTION

[0001] The present invention relates to a metal tank coupled with a synthetic material, in particular to a metal tank coupled with a synthetic resin material and a unit panel for it, in which the metal tank is constructed with a plurality of unit elements connected to provide a desired volume, each of which is fabricated by attaching a polyethylene sheet, which is harmless to the human body, on one surface of a galvanized iron plate, and filling a urethane resin between the other surface of the galvanized iron plate and a metal plate, thereby providing excellent cost competitiveness and waterproof property and durability while being harmless to the human body.

BACKGROUND OF THE INVENTION

[0002] In general, a rubber lining is good in chemical-resistant property, wear resistant property, high adhesion property, high reliability, and high construction property, as well as economic anti-erosion processing, and is easy to repair and for maintenance of the defect portions during use, in comparison with other organic and inorganic anti-erosion materials, and it occupies an important position in the field of the anti-erosion processing in a wide variety of industries in spite of the conspicuous development of the plastic industries.

[0003] Conventionally, a rubber lining technology is one of the anti-erosion technologies used to protect a structure from various chemicals including sulfur oxides (SOx), nitrogen oxides (NOx), and other harmful gases, which reduce the durability of an iron reinforced concrete and other structures,

and is one of the high-tech anti-erosion methods applicable to facilities for preventing the air pollution, facilities for processing the waste waters, the water processing facilities, and other chemical facilities. Especially, many water-purifying tanks often employ the rubber lining technology to carry out a water-proof processing in the inside of the tank.

[0004] Here, the rubber lining technology is divided into two types, of which the first type is by way of forming a desired thickness of thick films in the inside wall surface of a water purifying tank by spraying a synthetic resin, and the other type is by way of attaching a synthetic resin sheet in the inside surface of the tank.

[0005] In general, a water-purifying tank can be divided into a concrete structure type, which is excellent in construction property and cost competitiveness, and a metal tank type.

[0006] In the case of the water purifying tank made of the concrete structure, while water-proof is accomplished by applying a paint after constructing a mortar mixed with a water proof solution at the inside wall surface of the concrete tank, cracks can be produced due to the repeated expansion and contraction of the concrete, and a rubber lining is required to reduce water leakage. Also, in such a concrete structure type water-purifying tank, the rubber lining should periodically be repaired and maintained due to its repeated expansion and contraction.

[0007] In the case of the water purifying tank made of the metal material, a rubber lining is not required in the inside of the tank except at the ceiling surface where a chloride can be remained, as it uses a harmless stainless steel. However, in such a water purifying tank constructed of the stainless steel, it is not cost effective because the cost of the stainless material is high.

[0008] In addition, such a water purifying tank made of the stainless steel is to be provided with a plurality of separate reinforcement angles to reinforce the side portions at the inside and corner areas, and thus, results in increasing the production cost, while also making it difficult to use, clean and wash due to the reinforcement angle members.

[0009] In order to solve such problems, in Korean Utility Model Registration No. 1,358,000 (Reg. date: 1998. 11. 06), a large water tank made of the synthetic resin materials was suggested. In this invention, the large tank made of the synthetic resin materials was suggested to be manufactured by spraying the polyethylene resin at the inside wall of the tank made of the synthetic resin materials, so that the structural defects of the concrete structure can be solved and it has a cost competitiveness in comparison with the water purifying tank made of the stainless steel structure. However, it is very low in durability against an external force in comparison with the concrete structure and the water purifying tank made of the stainless steel structure. Especially, for the large or mid scale tank with a big static load or big dynamic load, it is required that a special reinforcement technology be applied to the inside and outside of the tank.

[00010] Another technology to solve such problems is a SMC (Sheet Molding Compound) tank, in which resin coating is applied to the metal plate made of the stainless steel or steel. Such technology is excellent in the hygiene property and earthquake resistant property, however, it is not cost effective because a special mold is required.

[00011] Accordingly, the structure of the present water purifying tank is urgently required that it is excellent in cost competitiveness like the concrete structure type, and is harmless to the human body like the stainless steel type, while also providing a structure not requiring a frequent repair and maintenance.

SUMMARY OF THE INVENTION

[00012] The present invention has been made to solve the above-mentioned problems occurring in the conventional art, and the object of the present invention is to provide a metal tank coupled with a synthetic resin, which is excellent in cost competitiveness, waterproof function, and durability as well as is harmless to the human body.

[00013] Another object of the present invention is to provide a unitary panel coupled with a synthetic resin and a metal tank with such a panel, which is provided with an engagement member and has an enhanced thermal insulation property and durability.

[00014] To accomplish the above objects, according to one aspect of the present invention, there is provided a metal tank coupled with a synthetic resin material, which includes a tank body made of a metal material, an inlet pipe and an overflow pipe communicating with an upper portion of the tank body respectively, an outlet pipe and a drain pipe communicating respectively with a lower portion of the tank body, and a ladder installed at an outer wall of the tank body, the metal tank is characterized by comprising: the tank body constructed of a plurality of first unit panels installed to form a bottom surface of the tank body, each of the first unit panels being made by stacking a synthetic resin sheet, a first metal plate, and a thermal insulation material in the order, and a plurality of second unit panels installed to correspond to edges of the first unit panels and to form side and upper surfaces of the tank body, each of the second unit panels being made by stacking the synthetic resin sheet, the first metal plate, the thermal insulation material, and a second metal plate in the order. The metal tank is further characterized by including: a plurality of stay reinforcement members, a first end of each stay reinforcement member installed at edges of the first unit panels forming the bottom surface of the tank body and a second end of each stay reinforcement member installed at

corresponding edges of the second unit panels forming a ceiling surface of the tank body; a plurality of beam reinforcement members, first and second ends of each beam reinforcement member installed at corresponding edges of the second unit panels forming the opposing side surfaces of the tank body, each of the beam reinforcement members at least partially welded to its corresponding stay reinforcement member; and securing means provided to secure corresponding edges of -adjacent unit panels from outside of the tank body; wherein the synthetic resin sheet is made of a polyethylene, and the first metal plate, the thermal insulation material, and the second metal plate are respectively made of a galvanized iron plate, a foamed urethane, and a painted color steel plate.

[00015] Preferably, the securing means may comprise: first and second engaging reinforcement plates, each arranged at corners of the adjacent unit panels; a securing screw for penetrating and securing the first engaging reinforcement plate, each of the adjacent unit panels, and the second engaging reinforcement plate in the order; and a nut secured at an end of the securing screw.

[00016] According to another aspect of the present invention, there is provided a unit panel with a synthetic resin material comprising: an upper surface plate portion; side surface plate portions, each of which is extending vertically from side edges of the upper surface plate portion and having a plurality of securing holes; and at least one tubular engagement member each coupled in a through-hole of the upper surface plate portion and with an upper surface and a lower surface externally exposed; wherein the unit panel is further characterized by a first metal plate of a painted color steel plate, a thermal insulation material of a foamed urethane disposed on an upper surface of the first metal plate, and a foamed polyethylene synthetic resin material disposed on an upper surface of the thermal insulation material and along side edges of the first metal plate so that the thermal insulation material is provided

between the first metal plate and the foamed polyethylene synthetic resin material.

[00017] Preferably, the upper surface of the engagement member is hermetically sealed with the foamed polyethylene synthetic resin material.

[00018] According to another aspect of the present invention, there is provided a metal tank coupled with a synthetic resin material, the metal tank having a tank body including a metal material, an inlet pipe and an overflow pipe communicating with an upper portion of the tank body respectively, an outlet pipe and a drain pipe communicating respectively with a lower portion of the tank body, and a ladder installed at an outer wall of the tank body, the metal tank is characterized by comprising: the tank body constructed of a plurality of first unit panels installed to form a bottom surface of the tank body, each of the first unit panels having a synthetic resin material, a first metal plate, and a thermal insulation material stacked in the order, and a plurality of second unit panels installed to correspond to edges of the first unit panels and to form side and upper surfaces of the tank body, each of the second unit panels having a synthetic resin material, a first metal plate, a thermal insulation material, and a second metal plate stacked in the order. The metal tank further comprises: a plurality of stay reinforcement members, a first end of each stay reinforcement member installed at edges of the first unit panels forming the bottom surface of the tank body and a second end of each stay reinforcement member installed at corresponding edges of the second unit panels forming a ceiling surface of the tank body; a plurality of beam reinforcement members, first and second ends of each beam reinforcement member installed at corresponding edges of the second unit panels forming the opposing side surfaces of the tank body, each of the beam reinforcement members at least partially welded to its corresponding stay reinforcement member; and securing means having an engaging reinforcement plate arranged at corner area of adjacent unit panels and having an engagement hole, a securing screw installed in penetration through the

engagement hole of the engaging reinforcement plate, through a through opening of a tubular engagement member coupled to the adjacent unit panels, and through an engagement hole of another reinforcement member in the order, and a nut secured at the penetrated end of the securing screw; wherein the synthetic resin material is made of a foamed polyethylene, and the first metal plate, the thermal insulation material, and the second metal plate are respectively made of a galvanized iron plate, a foamed urethane, and a painted color steel plate.

Advantageous Effects

[00019] According to the first embodiment of the present invention with the structure described above, it is possible to implement the metal tank, without using high-cost stainless steel, which is harmless to the human body and excellent in durability and waterproof property, and it is good in workability because a painted color steel plate is used for the second metal plate, and thus, removing the necessity of the additional application of plating or painting thereon.

[00020] Also, in the present embodiment, it is possible to reduce a production cost and is easy to clean the inside of the tank because a separate internal reinforcing work is not required, unlike the SMC tank or the water purifying tank made of the stainless steel.

[00021] In addition, in the present embodiment, a workability is improved because no welding work is required in the inside of the tank, and it is very advantageous to make a tank which requires a sanitary work as is with a water purifying tank.

[00022] Further, according to another embodiment of the present invention, it is possible not only to improve the durability by preventing a peeling

risk in the interface through applying foamed polyethylene without using adhesives, but also to accomplish a desirable thermal insulation performance by preventing compression of the thermal insulation material by means of the engagement member.

[00023] Also, according to the embodiment of the present invention, it is possible to reduce the production cost because the first metal plate is not used in the second unit panel of the metal tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[00024] FIG. 1 is a partially cut perspective view of a metal tank coupled with a synthetic resin material according to one embodiment of the present invention;

[00025] FIG. 2 is a cross-sectional view showing a portion of the metal tank according to the present invention;

[00026] FIGS. 3 to 6 are cross-sectional views showing principal portions of FIG. 1;

[00027] FIG. 7 is a perspective view of a unit panel with a synthetic resin material, having an engagement member coupled therein, according to the second embodiment of the present invention;

[00028] FIG. 8 is a cross-sectional view of FIG. 7 taken along line VIII-VIII;

[00029] FIG. 9 is a partially cut-away perspective view of the metal tank with the unit panel of FIG. 7;

[00030] FIG. 10 is an enlarged cross-sectional view illustrating an engagement portion of the unit panel with a reinforcement member;

[00031] FIG. 11 is a cross-sectional view showing a portion of the metal tank according to the present invention;

[00032] FIG. 12 and FIG. 13 are enlarged cross-sectional views showing the portions "A-1", and "B-1" of FIG. 10.

DETAILED DESCRIPTION OF THE INVENTION

[00033] Hereinafter, the metal tank coupled with the synthetic resin material, and the unit panel of the present invention will be described in detail with reference to the appended drawings.

[00034] FIG. 1 is a perspective view of a metal tank coupled with a synthetic resin material according to one embodiment of the present invention, wherein a portion of the tank is cut out, and FIG. 2 is a cross-sectional view showing a portion of the metal tank according to the present invention.

[00035] Referring now to FIGS. 1 and 2, the metal tank of the present invention is configured to be installed stably on a foundation plate 300 provided above pad portions 200 separated from each other and made of concrete material.

[00036] The metal tank of the present invention comprises a tank body 10 consisted of a plurality of first unit panels 10a forming a bottom surface, and a plurality of second unit panels 10b forming a side surface and an upper surface of the tank body, an inlet pipe 40, an overflow pipe 60 and an air vent 80 communicating respectively with an upper portion of the tank body 10, a drain pipe 70 and an outlet pipe 50 communicating with a lower portion of the tank body 10, and also a ladder 90 is mounted at an outer surface of the

second unit panel 10b for operating, cleaning the inside of the tank, and repairing and maintaining the tank.

[00037] Here, the inlet pipe 40 and the air vent 80 are communicated with the upper surface of the second unit panels 10b forming the upper surface of the tank body 10, the overflow pipe 60 is communicated with the upper side surface of the second unit panels 10b forming the side of the tank body 10.

[00038] The drain pipe 70 is communicated with the first unit panels 10a, and the outlet pipe 50 is communicated with the lower side surface of the second unit panels 10b forming the side of the tank body 10.

[00039] Side edge portions of the first and second unit panels 10a, 10b are bent outwardly, and the adjacent unit panels 10a, 10b are positioned for the bent portions be contacted with each other and engaged with each other by means of securing means 30 from the outside of the tank body 10.

[00040] In the present invention, a plurality of stay and beam reinforcement members 22, 24, 26 are installed in the inside of the tank body 10 to reinforce the tank body 10. The stay reinforcement members 22 are installed between the edges of the plurality of the first unit panels 10a arranged adjacent and engaged integrally and between the edges of the second unit panels 10b arranged adjacent and engaged integrally to form a ceiling surface in a manner such that the stay reinforcement members are spaced apart from each other. The stay reinforcement members 22 are preferably installed at the corner areas of the unit panels 10a, 10b.

[00041] The beam reinforcement members 24, 26 are configured to reinforce the sides of the tank body 10 and are installed between the adjacent edges of the plurality of the second unit panels 10b and engaged integrally with each other in a manner to oppose such that the beam reinforcement members

are spaced apart along the sides of the tank body 10. The beam reinforcement members 24, 26 are preferably installed at the corner areas of the second unit panels 10b.

[00042] FIGS. 3 to 6 are cross-sectional views of the principal portions of FIG. 1.

[00043] Referring now to FIGS. 3 to 6, the metal tank of the present invention is constructed with the first unit panels 10a, each of which made by stacking a synthetic resin sheet 11, a first metal plate 13, and the thermal insulation material 15 in the order, and the second unit panels 10b, each of which made by stacking a synthetic resin sheet 11, a first metal plate 13, the thermal insulation material 15, and a second metal plate 17 in the order.

[00044] Here, the synthetic resin material 11 is made of a polyethylene (P.E.) which is harmless to the human body, and is especially suitable for a material for the water-purifying tank.

[00045] Also, the first metal plate 13 is made of the galvanized iron plate in place of the high-cost stainless steel conventionally used, and the second metal plate 17 is made of a colored steel plate in place of the high-cost stainless steel conventionally used, and is not required to apply separate painting, and the like, thereon.

[00046] The thermal insulation material 15 is made of a foam shaped urethane, which is excellent in buffer property, thermal insulation property, and earthquake resistant property.

[00047] With regard to the thickness of the constructing elements, it is preferable that they have thicknesses decreasing in the order of the thermal

insulation material 15, the synthetic resin sheet 11, the first metal plate 13, and the second metal plate 17.

[00048] An adhesive 12 is applied at an interface between the synthetic resin material 11 and the first metal plate 13 of the first and second unit panels 10a, 10b to thereby produce complete close contacts between them.

[00049] Here, as described above, the securing means 30 engages the bent edge portions of the adjacent first and second unit panels 10a, 10b with each other at the outside of the tank body 10. The securing means 30 consists of an engaging reinforcement plate 30a placed at the corners of the contacted unit panels 10a, 10b, an engaging screw 30b passing through the engaging reinforcement plate 30a, the bent edges of the unit panels 10a, 10b, and the other engaging reinforcement plate 30a, and a nut 30c is engaged at one end of the engaging screw 30b.

[00050] FIG. 7 is a perspective view showing a unit panel with a synthetic resin material, to which an engagement member is coupled, according to the second embodiment of the present invention, and FIG. 8 is a cross-sectional view of FIG. 7 taken along line VIII-VIII. Referring to FIGS. 7 and 8, the unit panel 500 of the present invention comprises an upper plate portion 510, side plate portions 520 extending vertically from the rectangular side surfaces of the upper plate portion 510, and a plurality of engaging members 550 provided to pass through the upper plate portion 510.

[00051] The upper plate portion 510 is formed to have a central recess depressed in the downward direction, and the engaging members 550 are provided at the corners thereof.

[00052] The side plate portion 520 is formed to have a plurality of engagement holes 532 in the longitudinal direction.

[00053] Now, referring to the structure of the unit panel 500 of the present invention, it is constructed that the synthetic resin sheet 561, the thermal insulation material 563, and the second metal plate 565 are stacked in order. The unit panel 500 is also coupled with a plurality of engagement members 550 of tubular body shape which pass through the upper plate portion 510.

[00054] Here, the materials of the synthetic resin material 561, the thermal insulation material 563, and the second metal plate 565 are respectively a polyethylene, a foam shaped urethane, and a painted color steel plate. Especially, the synthetic resin material 561 of the present invention is formed to securely cover the upper surface of the thermal insulation material 563 and side edges of the second metal plate 565, and is able to prevent from the peeling risk, as in the previous embodiment, ~~of~~ at the interface when using the adhesive 12 (see FIGS. 3 to 6).

[00055] The engagement member 550 is provided to effectively prevent the decrease of the thermal insulation property by the compression of the thermal insulation material 563 when the reinforcement member 622 (624; 626) (refer to FIG. 10) is fastened with the unit panel 500 by means of the securing means 630, which will be described below. Here, the engagement member 550 is preferably made of a metal material or a rigid body of a synthetic resin material having a sufficient strength and hardness.

[00056] In the present embodiment, it is possible to minimize the waste of the metal materials to thereby reduce the production cost, because it is not required in the unit panel 500 to provide the first metal plate 13 (FIGS. 3-6) between the synthetic resin material 11 and the thermal insulation material 15 as in the first embodiment of the present invention, owing to the provision of the engagement member 550.

[00057] The engagement member 550 is inserted and engaged into a through-hole (not referenced) in the second metal plate 565 of the unit panel 500 of the present embodiment, or it is secured integrally with the metal plate 565 by welding an outer peripheral edge of the engagement member inserted into the through-hole.

[00058] The upper surface of the engagement member 550 of the present embodiment is hermetically sealed by the foamed synthetic resin material 561 as shown in FIG. 8. This can eliminate the use of a separate water proof material which is required if the upper surface and the lower surface have a completely opened structure, and is able to accomplish the water proof at the time of the reinforcement. In other words, in the present embodiment, as the upper surface of the engagement member 550 is hermetically sealed by the foamed synthetic resin material 561, it is possible to accomplish the water-proof without using any separate water proof material at the time of construction.

[00059] Further, as shown in FIG. 8, the lower surface of the engagement member 550 is preferably open, however, it may optionally be closed depending on the existence of the reinforcement.

[00060] FIG. 9 is a partially cut-away perspective view of the metal tank coupled with the synthetic resin material according to the present embodiment. Referring now to FIG. 9, the metal tank of the present invention has a structure that it is located stably on the foundation plate 800 provided on the upper surface of the pad portions 700 made of the concrete material and separated from each other.

[00061] The metal tank of the present invention comprises a tank body consisted of a plurality of the first unit panels 500a forming the lower surface of the tank body, and the second unit panel 500b forming the side surface and the upper surface of the tank body, the inlet pipe 640, the overflow pipe 660, and

the air vent 680, communicating respectively with the upper portion of the tank body 600, and the drain pipe 670 and the outlet pipe 650 communicating respectively with the lower portion of the tank body 600. In addition, the ladder 690 is also provided at the outer surface of the second unit panel 500b for the purposes of using, cleaning the inside of the tank, and repair and maintenance.

[00062] Here, the inlet pipe 640 and the air vent 680 are communicated with the upper surface of the second unit panels 500 forming the upper surface of the tank body 600, and the overflow pipe 660 is communicated with the upper side surface of the second unit panels 500 forming the side of the tank body 600. Also, the drain pipe 670 is communicated with the first unit panels 500a, and the outlet pipe 650 is communicated with the lower side surface of the second unit panels 500 forming the side of the tank body 600.

[00063] The edges of the first and second panels 500a, 500b are bent to the outside direction (see FIG. 11), and the adjacent unit panels 500a, 500b are positioned closely to each other with the bent surfaces abutting each other, and they are coupled with each other from the outside of the tank body 600 by the securing means 630. Also, in the present invention, a plurality of stay reinforcement members 622 and a plurality of beam reinforcement members 624, 626 are installed at the inside of the tank body 600 to reinforce the tank body 600.

[00064] The stay reinforcement members 622 are installed such that both ends of the respective reinforcement member 622 are spaced apart and support between the adjacent edges of the plurality of the first unit panels 500a and engaged integrally, and between the adjacent edges of the plurality of the second unit panels 500 and engaged integrally to form the ceiling surface. Here, it is preferable that the stay reinforcement members 622 are installed at the corners of the unit panels 500a, 500. The beam reinforcement members 624, 626 ~~form~~ reinforce the side surface of the tank body 600, and are installed

such that both ends of them be spaced apart between the edges of the plurality of the second unit panels 500 adjacent and opposing to each other and engaged integrally. Here, the beam reinforcement members 624, 626 are preferably installed at the corners of the second unit panels 500.

[00065] FIG. 10 is an enlarged cross-sectional view of the engaging portion of the unit panel and the reinforcement member of the present embodiment. Referring to FIG. 10, the present embodiment prevents the reduction of the thermal insulation property as in the previous embodiment due to the compression of the thermal insulation material 13 (refer to FIGS. 3 to 6), by providing the unit panel 500 which is coupled with the engagement member 550 to prevent the unit panel 500 from being compressed when the unit panel 500 is coupled with the corresponding respective reinforcement member 622, 624, 626 by means of the securing means 630.

[00066] The securing means 630 includes an engaging reinforcement plate 630a arranged at corner of the adjacent unit panels and having an engagement hole (not referenced), an engaging screw 630b configured to be inserted into the engagement hole of the engaging reinforcement plate 630a, and a nut 630c fastened to one end of the engaging screw 630b inserted. Here, the detailed explanation about the sectional structure and constitution of the unit panel 500 will be abridged because they were explained above in connection with FIGS. 7 and 8.

[00067] Describing with regard to the engagement process, the engaging screw 630b passes through the engagement hole of the engaging reinforcement member 630a, the through-hole of the engagement member 550, and the engagement hole (not referenced) of the reinforcement member 622, 624 and 626 sequentially, and the penetrated end is strongly fastened by the nut 630c. Here, as shown in FIG. 8, as the upper surface of the engagement hole in the engagement member 550 is hermetically sealed by the synthetic

resin material 561, the engaging screw 630b is forced to penetrate through the synthetic resin material 561 and passes through the engagement hole of the engagement member 550. In this regard, the synthetic resin material 561 functions as a packing for sealing.

[00068] The present invention is constructed such that the engagement member 550, made of a rigid body, can support the unit panel 500 so that it is not compressed when the unit panel 500 is coupled with the reinforcement members 622, 624, 626 by means of the securing means 630. Accordingly, it is possible to prevent the reduction of the thermal insulation property due to the compression of the thermal insulation material 13 (refer to FIGS. 3 to 6) as in the first embodiment.

[00069] Although the present embodiment has been explained above in connection with only the second unit panels 500, the same description can be applied to the first unit panels 500a, and the detailed explanation about it is omitted. It is noted that the only difference between the first and second panels 500a, 500 is the difference in the cross-sectional structure (see FIGS. 12 and 13).

[00070] FIG. 11 is a cross-sectional view showing a portion of the metal tank shown in FIG. 9. FIGS. 12 and 13 are enlarged cross-sectional views of the portions "A-1", and "B-1".

[00071] Referring now to FIGS. 11 to 13, the metal tank of the present invention is constructed with the first unit panel 500a made by stacking a synthetic resin material 561, a first metal plate 567, and a thermal insulation material 563 in the order, and the second unit panel 500 made by stacking a synthetic resin material 561, a thermal insulation material 563, and a second metal plate 565 in the order. Here, the synthetic resin material 561 is made of the polyethylene (P.E.) which is harmless to the human body, and is especially

suitable to the material for the water-purifying tank. Also, the first metal plate 567 is made of the galvanized iron plate in place of the high-cost stainless steel conventionally used, and the second metal plate 563 is made of a color steel plate in place of the high-cost stainless steel conventionally used as described above, and it is not required to apply separate paintings, and the like.

[00072] The thermal insulation material 563 is made of the foam shaped urethane, which is excellent in buffer property, thermal insulation property, and earthquake resistant property.

[00073] With regard to the thickness of the constructing elements, it is preferable that they have thicknesses decreasing in the order of the thermal insulation material 563, the synthetic resin material 561, the first metal plate 567, and the second metal plate 565.

INDUSTRIAL APPLICABILITY

[00074] As described above, the present invention relates to a metal tank coupled with a synthetic resin material and a unit panel thereof, which is constructed with a plurality of unit elements connected to provide a desired volume in the tank, each of which is fabricated by attaching a polyethylene sheet harmless to the human body on one surface of a galvanized iron plate and filling a urethane resin between the other surface of the galvanized iron plate and a metal plate, thereby ensuring excellence in cost competitiveness and waterproof property and durability while being harmless to the human body.

[00075] While the present invention has been described with reference to the preferred embodiments, the present invention is not restricted by the embodiments. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the

present invention. However, such variations and modifications are all pertained to the scope of the present invention.